
Visual Trend Analysis with Digital Libraries

Authors:

Kawa Nazemi, Reimond Retz, Dirk Burkhardt, Arjan Kuijper, Jörn Kohlhammer & Dieter W. Fellner

Contact:

Dr.-Ing. **Kawa Nazemi**

Fraunhofer IGD

Fraunhoferstr. 5

64283 Darmstadt

Presentation at:



Tel.: +49 6151 155 – 551

Fax: +49 6151 155 – 139

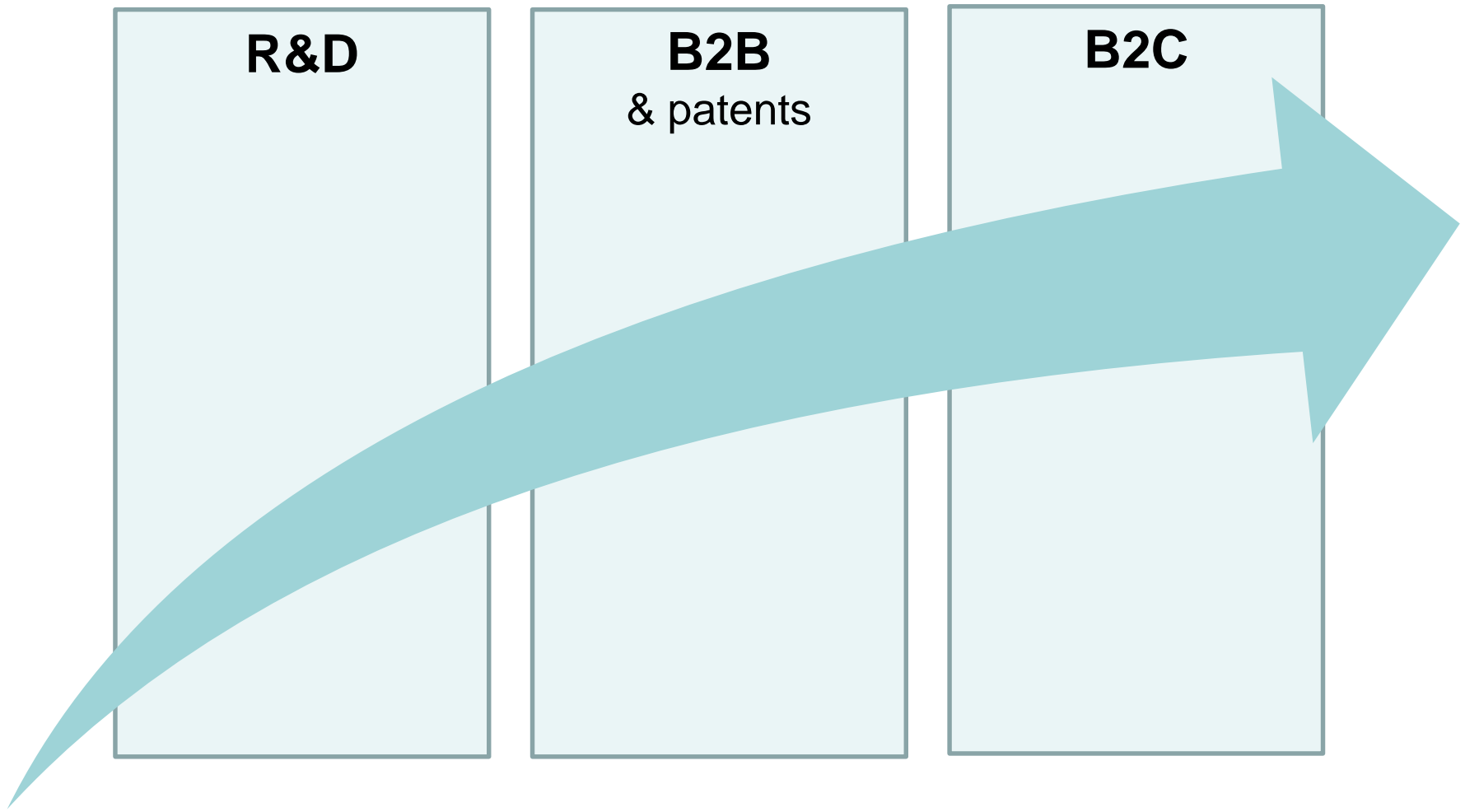
Email: kawa.nazemi@igd.fraunhofer.de

Motivation

- Increasing development of new technologies, methods, products, materials etc.
- Exploitation of those in various further business areas:
 - Example: Visual Analytics in
 - Security
 - Medicine and healthcare
 - Policy Modeling
 - Business Intelligence

→ *Early awareness of technological trends are essential for market analysis and competitiveness*

Motivation: Stages of technological awareness



Motivation: Open Data in Digital Libraries

- Distributed Data in various DL resources
- Data repositories (e.g., DBLP) with no sufficient information for trend analysis:
 - **When** have technologies or topics emerged and when established?
 - **Where** are the key-players and key-locations?
 - **Who** are the key-players?
 - **Which** technologies or topics are relevant?
 - **How** will the technologies probably evolve in the next years?

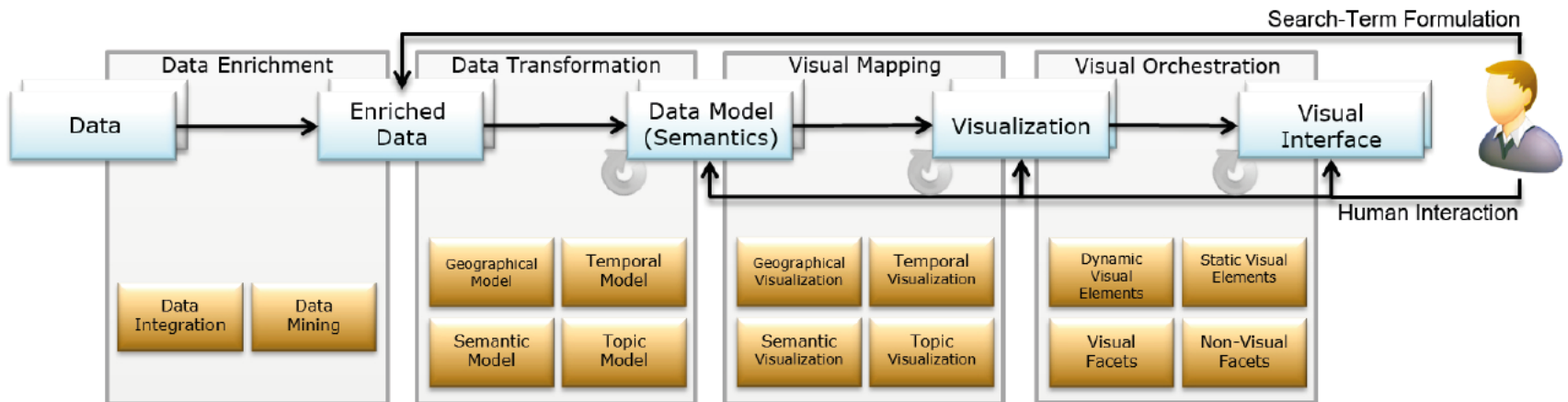
Research Goals

- Approach for:
 - Integrating information from heterogeneous resources
 - Mining information from the enriched data
 - Visualizing information for trend analysis
- Targeted Solution
 - a model for gathering trends from heterogeneous digital library source for interactive visual analysis
 - the combination of visual layouts with data mining approaches for analyzing trends
 - a model for assisted search that enables to explore an unknown domain

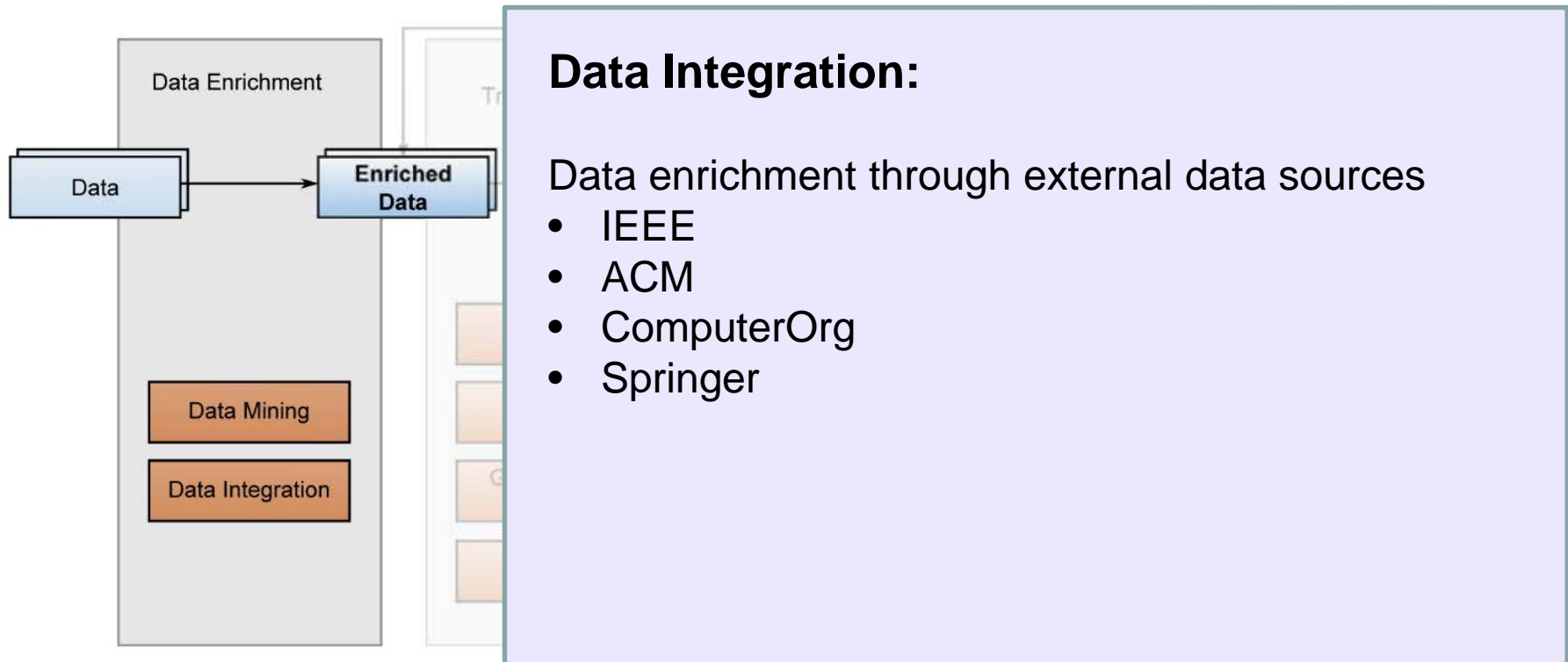
Research Goals: Main Outcome

A coherent model for the entire transformation of textual and semi-annotated data from various data sources to aspect-oriented visualizations for supporting the trend analysis process.

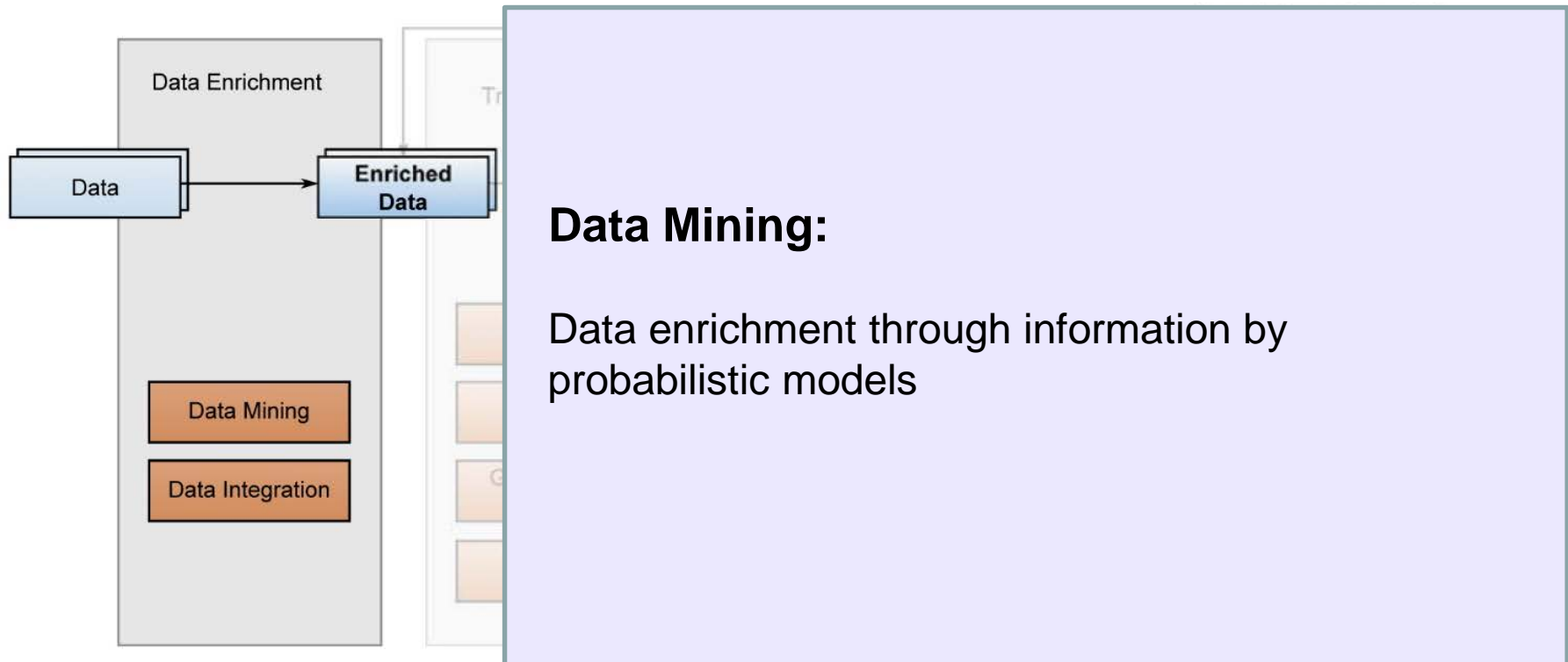
Approach: Visual Data Transformation



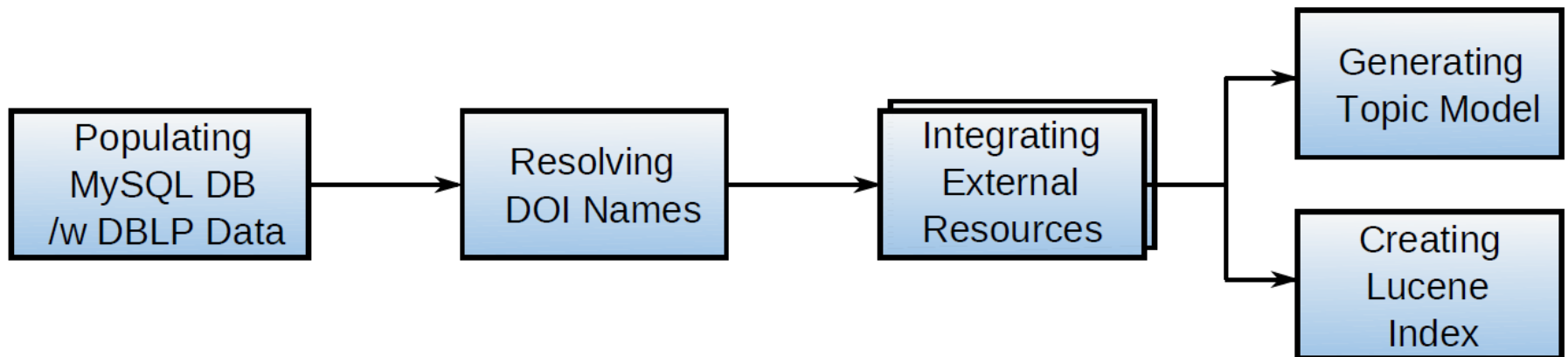
Approach: Data Enrichment (I)



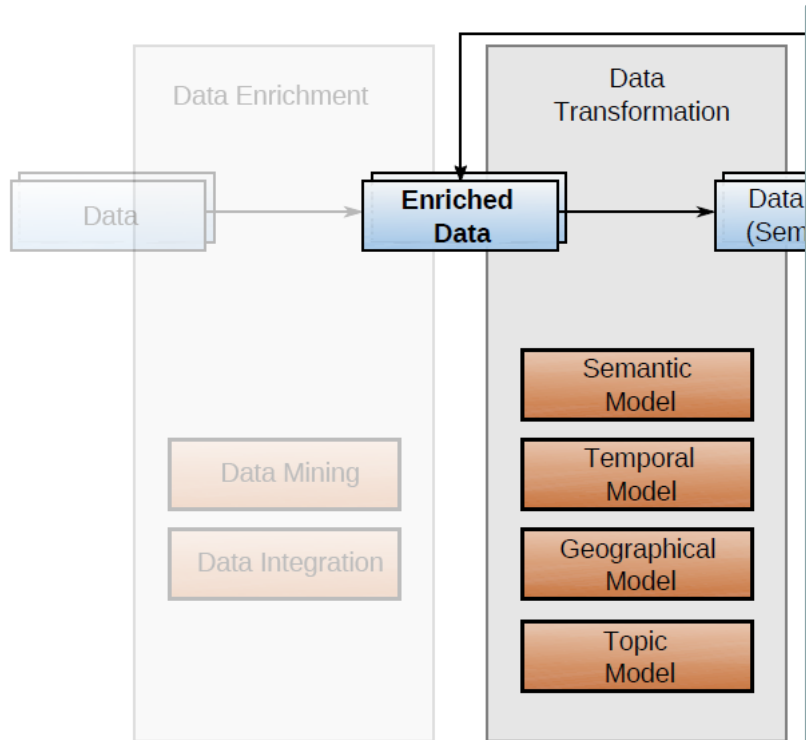
Approach: Data Enrichment (II)



Approach: Data Enrichment: Example DBLP



Approach: Data Transformation (II)



Data Transformation:

Aspect-oriented data models for visualization

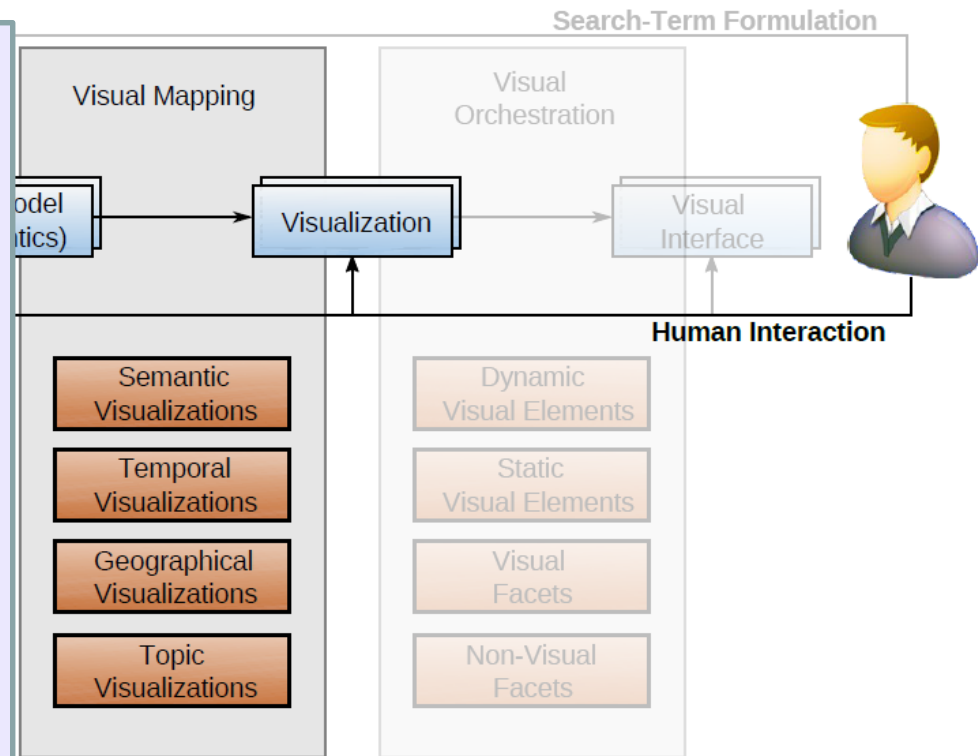
- Semantic model
- Temporal model
- Geographical model
- Topic model

Approach: Visual Mapping

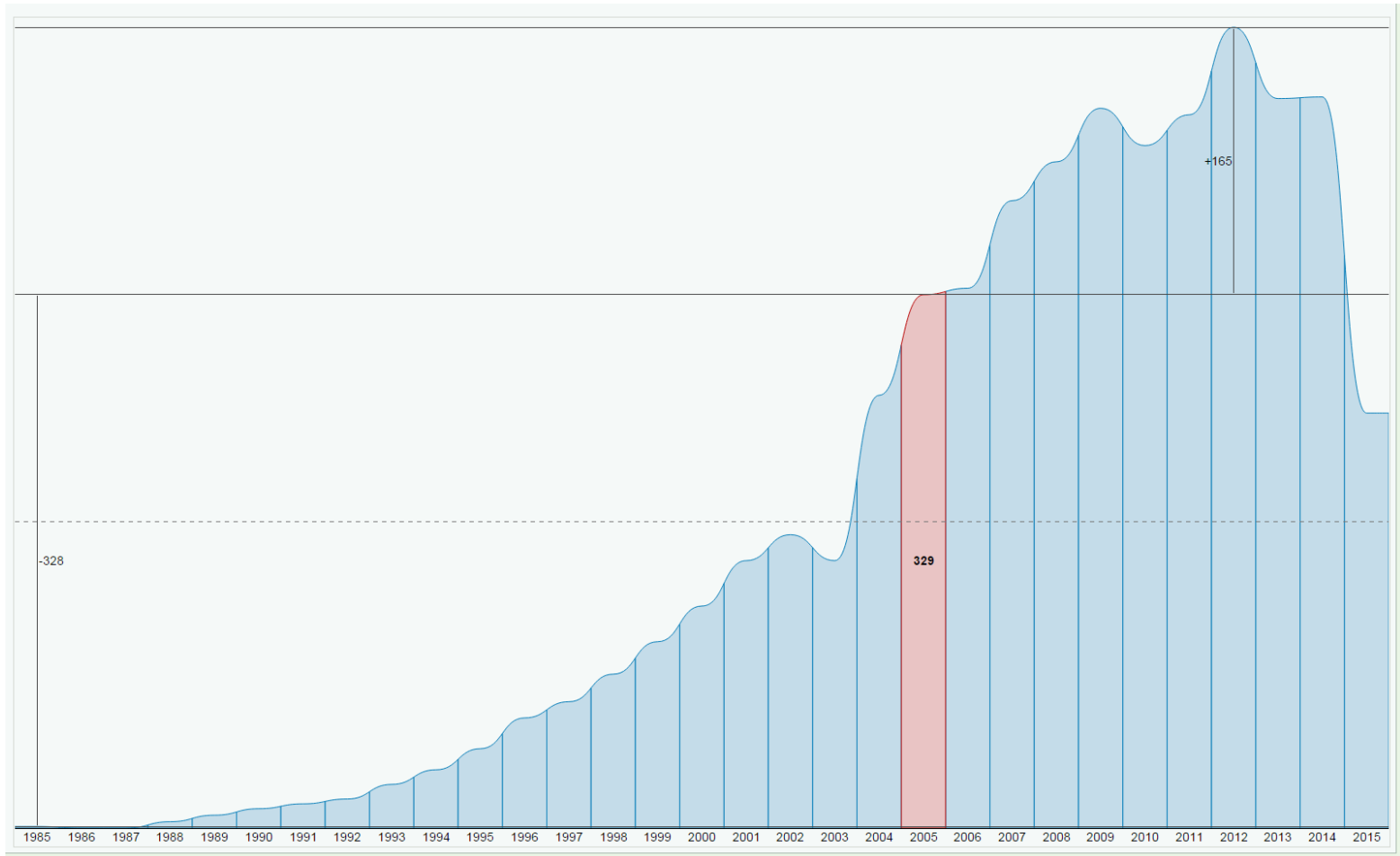
Data Transformation:

Aspect-oriented data visualization for each data model

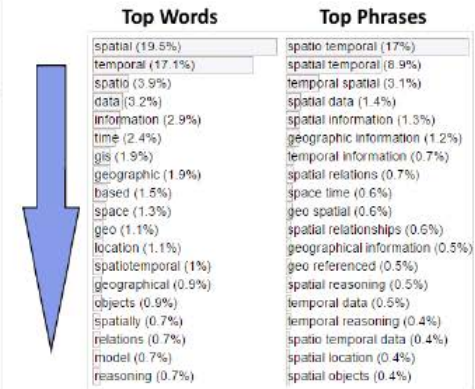
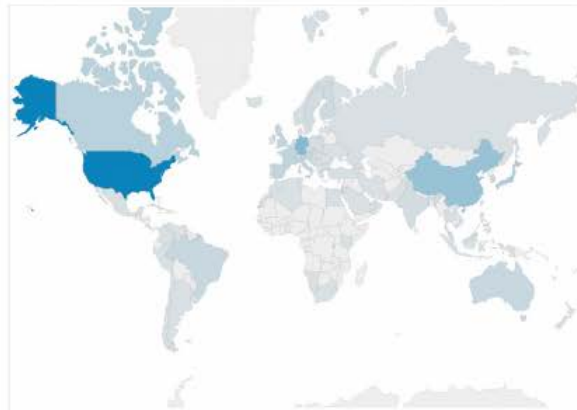
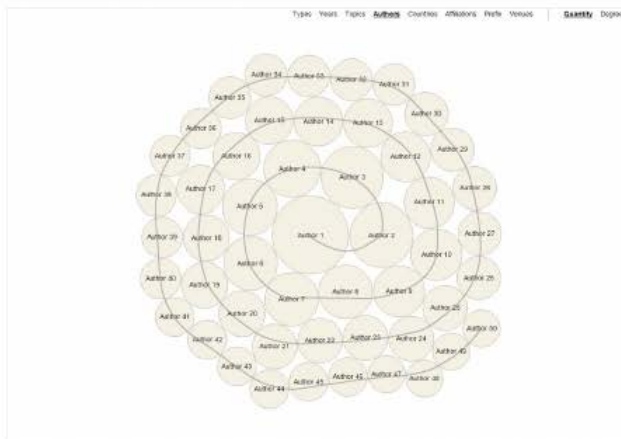
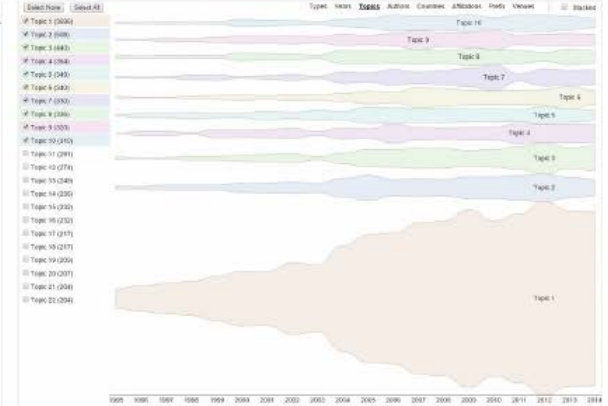
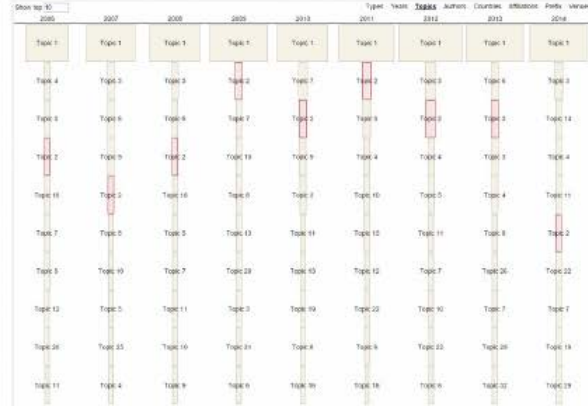
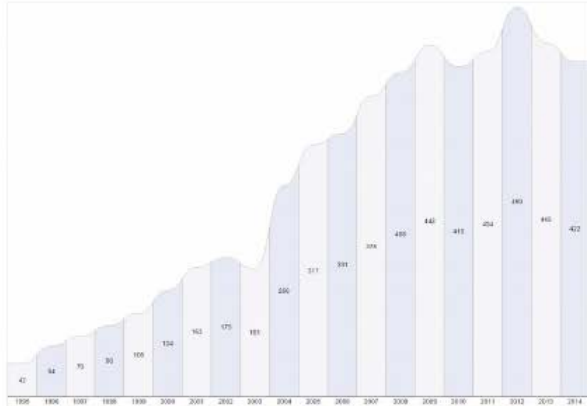
- Semantic visualization
- Temporal visualization
- Geographical visualization
- Topic visualization



Visual Mapping: temporal overview visualization



Visual Mapping: Aspect-oriented visualizations

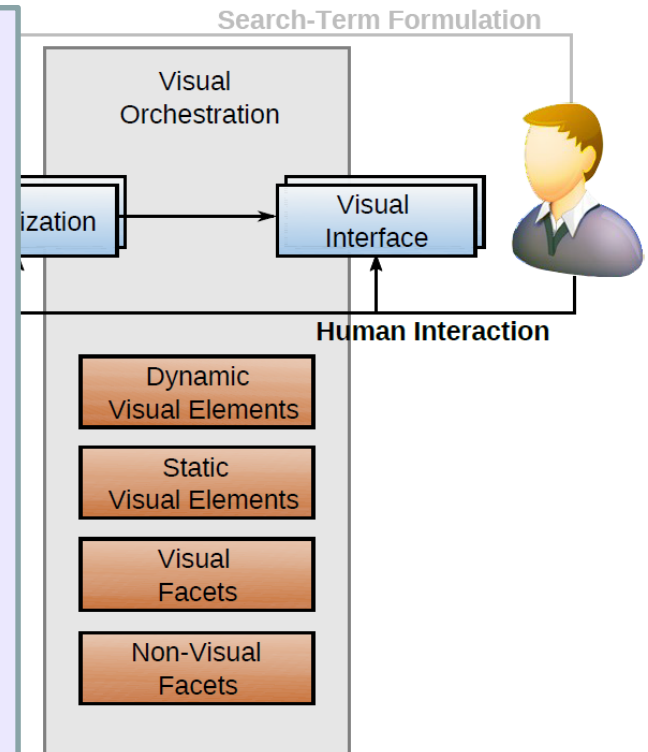


Approach: Visual Orchestration

Visual Orchestration:

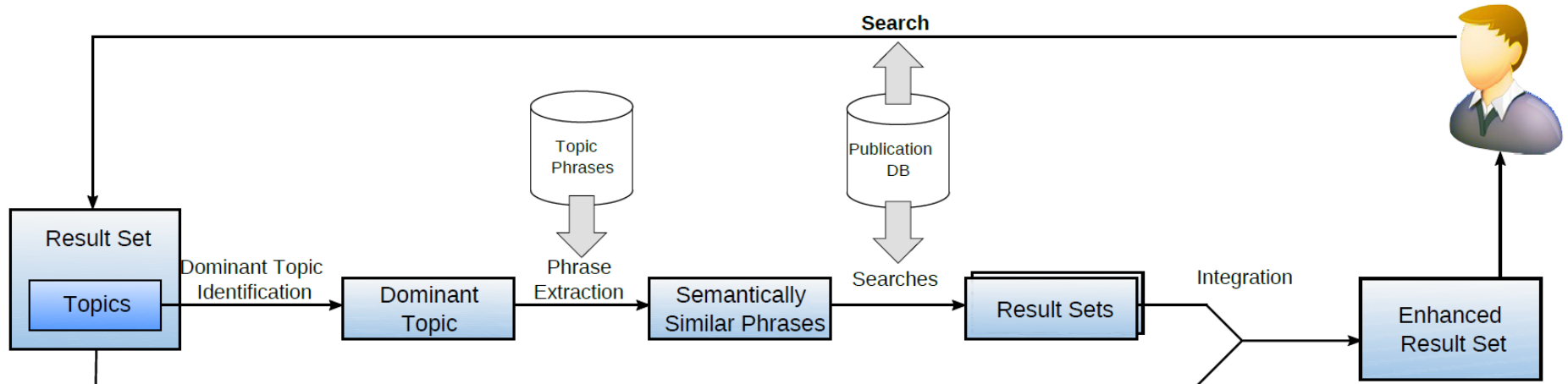
Coherent interplay of visualizations and interaction techniques

- Static UI elements
- Dynamic (responsive) UI elements
- Visual facets
- Textual facets

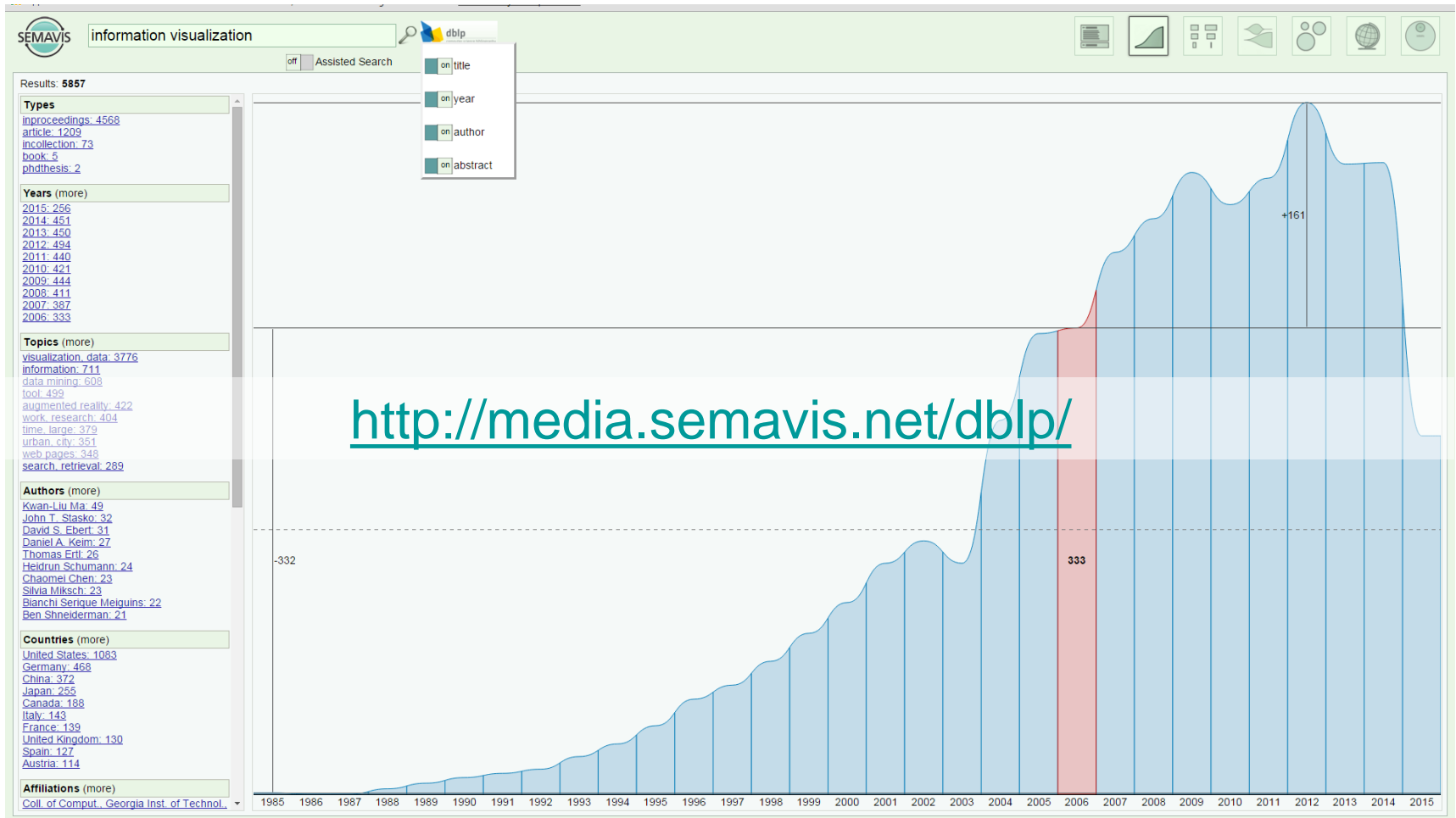


Approach: Assisted Search Model

- Enabling the process of exploration through assisted search:



Appliance to SemaVis



Conclusion

- We proposed a coherent model for visual trend analysis:
 - Data Enrichment by data integration from different sources
 - Data mining for information extraction
 - Data modeling for a variety of different views on the data
 - Visual mapping to support the different enabled data perspectives
 - Visual orchestration to combine dynamic and static visual representations and different interaction techniques
- Assisted search to support the exploration process
- The model was applied in SemaVis, a semantics visualization technology

Acknowledgments

- This work is part of the SemaVis Technology developed by Fraunhofer IGD:

- www.semavis.net



- This work was partially funded by the European Commission:



Thank you for your attention!

Please find a video of the system on:

<http://media.semavis.net/dblp/>